





ORIGINAL ARTICLE

Factors related to mental health effect among nursing students in Japan and the United States during the coronavirus pandemic: A cross-sectional study

Akiko Kondo,¹  Renaguli Abuliezi,¹ Kosuke Niitsu,²  Kazuko Naruse,³ Tomomi Oki,⁴ Erika Ota^{5,6} and Mabel C. Ezeonwu²

¹International Nursing Development, Graduate School of Health Care Sciences, Tokyo Medical and Dental University, Tokyo, Japan, ²School of Nursing and Health Studies, University of Washington Bothell, Bothell, Washington, USA, ³School of Nursing, Tokyo Medical University, Tokyo, ⁴School of Nursing and Rehabilitation Sciences, Showa University, Yokohama-shi, ⁵St. Luke's International University, and ⁶Tokyo Foundation for Policy Research, Tokyo, Japan

ABSTRACT: *In the context of mental health, university students have been considered a vulnerable population. However, limited studies have underscored the association between preventive health behaviour levels and mental health effects among nursing students. The current cross-sectional study provides a comparative analysis of the impact of mental health factors on nursing students in Japan and the United States (US) in the context of the coronavirus disease 2019 (COVID-19) pandemic. The study consisted of 878 participants, comprising both undergraduate and graduate nursing students from four universities in Japan, and one from the US. Hierarchical logistic regression was used to analyse the participant data in this study. In contrast to the American students, the Japanese students demonstrated significantly lower levels of perceived control and significantly higher levels of preventive health behaviours. Furthermore, Japanese students exhibited significantly higher levels of stress and/or symptoms of depression induced by the social distancing orders compared to the American students ($z = -4.218$, $P < 0.001$). However, no difference was observed after adjusting for perceived control, individual factors, socio-economic factors, and preventive behaviours. During the pandemic, risk factors that can worsen mental health among the nursing students included younger age [odds ratio (95% CI) = 0.62 (0.48–0.81)], women [OR = 2.17 (1.02–4.61)], higher preventive health behaviour*

Correspondence: Akiko Kondo, International Nursing Development, Graduate School of Health Care Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima Bunkyo-ku, Tokyo 113-8519 Japan. Email: akondo.ind@tmd.ac.jp

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Akiko Kondo, PhD, RN.

Renaguli Abuliezi, MS.

Kosuke Niitsu, PhD, ARNP, PMHNP-BC.

Kazuko Naruse, PhD, RN.

Tomomi Oki, PhD, RN.

Erika Ota, PhD, RNM.

Mabel C. Ezeonwu, PhD, RN.

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[OR = 1.05 (1.02–1.08)], lower perceived control [OR = 0.97 (0.94–0.99)], and lower perceived health competence [OR = 0.93 (0.90–0.96)]. Thus, this study recommends establishing training programmes that enhance perceived control and perceived health competence while encouraging preventive behaviour to support the mental health of nursing students, particularly young female students.

KEY WORDS: comparative analysis, control beliefs, COVID-19 pandemic, mental health, nursing students.

INTRODUCTION

The coronavirus disease 2019 (COVID-19) has had global adverse effects. As of 19 June 2022, 535 million COVID-19 cases have been confirmed, resulting in over 6 million deaths worldwide (World Health Organization (WHO) 2022). Until 2021, the Western Pacific had a relatively low number of cases. However, since early 2022, this amount has increased significantly. To mitigate the transmission of infections, several countries implemented lockdown measures or declared a national emergency, impacting social and academic activities. Lockdown is a security measure taken during an emergency to prevent people from leaving or entering a building or other locations (Dictionary.com 2022), as well as instructions for populations to refrain from going out of their homes for non-essential reasons including the use of stores and facilities (Yamamoto *et al.* 2020). For example, students had to stay home and engage in online classes.

In the context of mental health, university students are considered a vulnerable population as most of them are transitioning into adulthood and often experience economic and material challenges (Sequeira *et al.* 2022). Previous studies have underscored the negative mental health effects of COVID-19 on university students (Husky *et al.* 2020; Sequeira *et al.* 2022; Zhu *et al.* 2021). Furthermore, nursing students training to become health professionals experience emotional, social, physiological, psychological, and financial burdens as exacerbated by the pandemic, resulting in burnout. According to a study in China, almost 10% of final-year undergraduate nursing students expressed intentions of leaving the nursing profession after the onset of the pandemic (Nie *et al.* 2021). In the United States (US), approximately 25% of graduate nursing students reported moderate to extremely severe levels of negative emotional states during the COVID-19 pandemic (Rosenthal *et al.* 2021). Furthermore, a study in Spain reported that most nursing students were

emotionally affected, expressing high levels of anxiety resulting from e-learning (García-González *et al.* 2021). Moreover, a study conducted in Japan reported that both nurses and nursing students experienced increased fear, anxiety, voluntary restraint, and decreased motivation under the national state of emergency in 2020 (Hasuike *et al.* 2021).

BACKGROUND

A systematic review and meta-analysis (Mulyadi *et al.* 2021) revealed that during the COVID-19 pandemic, depression (52%), and other COVID-19-related health problems, namely, fear (41%), anxiety (32%), stress (30%), and sleep disturbances (27%) were the most prevalent health problems among nursing students. Thus, Mulyadi *et al.* (2021) recommend future studies to examine the specific factors associated with mental health problems among nursing students during the COVID-19 pandemic.

Several studies have underscored factors associated with improved preventive health behaviours among nursing students. These factors include individuals who are older, are an upperclassman, are female, possess higher eHealth literacy, live in urban areas, and have a positive attitude towards and good knowledge of COVID-19 (Albaqawi *et al.* 2020; Yuan *et al.* 2020), as well as who have longer sleeping hours, have higher health competence, and work shorter hours (Kondo *et al.* 2021).

Furthermore, perceived control is an important factor influencing improved preventative behaviours and mental health. Perceived control is defined as ‘an individual’s subjective beliefs about the amount of control he or she has over the environment or outcome’. Conversely, ‘actual control describes the objective amount of control the individual has over the environment or outcome’ (Villarreal & Heckhausen 2017; p. 254). Previous studies showed that perceived control was associated with higher preventive behaviours during COVID-19

pandemic (Kondo *et al.* 2021; Goodwin *et al.* 2021). However, increased preventive behaviour was associated simultaneously with deteriorating mental health effects, such as feeling stressed and depressed due to adherence to social distance measures, and exacerbating isolation from society (Kondo *et al.* 2021). Whereas, a study in China found that lower levels of preventive behaviours among nursing students were associated with higher anxiety (Sun *et al.* 2020).

A global study ($N = 48\,951$), which was not specific to the pandemic, found that Japanese people demonstrated the lowest levels of perceived control among 38 nations; meanwhile, the US had higher levels of perceived control than the global average (Hornsey *et al.* 2019), even though they had a significantly higher infection and death rates than that of Japan and most of the world (WHO 2022). Furthermore, it has been reported that perceived control could buffer the severity of regional psychological effects by moderating the effects of psychological distance among Chinese people (Zheng *et al.* 2020). Therefore, the difference in the level of perceived control between Japan and the US can impact the mental health of nursing students. Since studies on the association between preventive health behaviour levels and mental health effects among nursing students are lacking, by comparing the factors influencing the mental health of nursing students between Japan and the US and examining the associated factors, this study fills a scholarly gap and may reveal insightful culturally-contextual information to support the mental health of nursing students during the pandemic.

Conceptual framework and definitions

Figure 1 depicts the conceptual framework used in this study based on the combination of Robinson and Lachman's control model (Robinson & Lachman 2017) and the social-ecological model adapted from the National Institute of Health (e-Source Behavioral & Social Sciences Research n.d.). The control model suggests that sociodemographic factors affect control beliefs, subsequently affecting performance. Using the control model, this study identified sociodemographic factors as the country of origin, socioeconomic status, biological factors, and basic health-related factors. On the other hand, social-ecological model includes multiple levels of influence, such as public policy, community, organizational, interpersonal, and individual factors, where behaviours both shape and are shaped by the

social environment. In this study, among sociodemographic factors, country belongs to public policy and community level, socioeconomic status belongs to organizational and interpersonal levels, and basic health-related factors and biological factors belong to individual factors as indicated on the far-left side of the figure.

Control beliefs included perceived control and perceived health competence. Perceived control refers to an integral element of social capital, defined as 'networks together with shared norms, values, and understandings that facilitate co-operation within or among groups' (Foxton & Jones 2011; p. 1). Individuals who believe that they have robust control over their behaviours and possess influence over policy decisions impacting their community may achieve more positive health outcomes (Salehi *et al.* 2016). Perceived health competence was defined as a measure of one's sense of competence in the domain of health behaviours (Smith *et al.* 1995). In this sense, while perceived control is more closely related to public policy and community (positioning higher level in the figure), perceived health competence is more on the individual level. Both perceived control and perceived health competence can be affected by sociodemographic factors. Thus, individuals with high control beliefs may then work collectively to improve broader societal or public health outcomes.

Finally, performance was defined as COVID-19 preventive behaviours and mental health effects. Mental health effects were defined as the adverse effects induced by social distancing and stay-at-home measures influencing the nursing students, particularly feelings of stress and/or depression, or feeling alienated from society. These performances can be affected by sociodemographic factors and the two control beliefs.

This study aimed to compare the impact of mental health on nursing students between Japan and the US and examine the relationship between preventative health behaviours and mental health effects, as well as the relationship between perceived control and mental health effects during the COVID-19 pandemic.

The following hypotheses were established:

1. The mental health effect is higher (worse) in Japanese students than in American students.
2. Higher preventive health behaviours are associated with higher (worse) mental health effects.
3. Higher perceived control is associated with lower (improved) mental health effects.

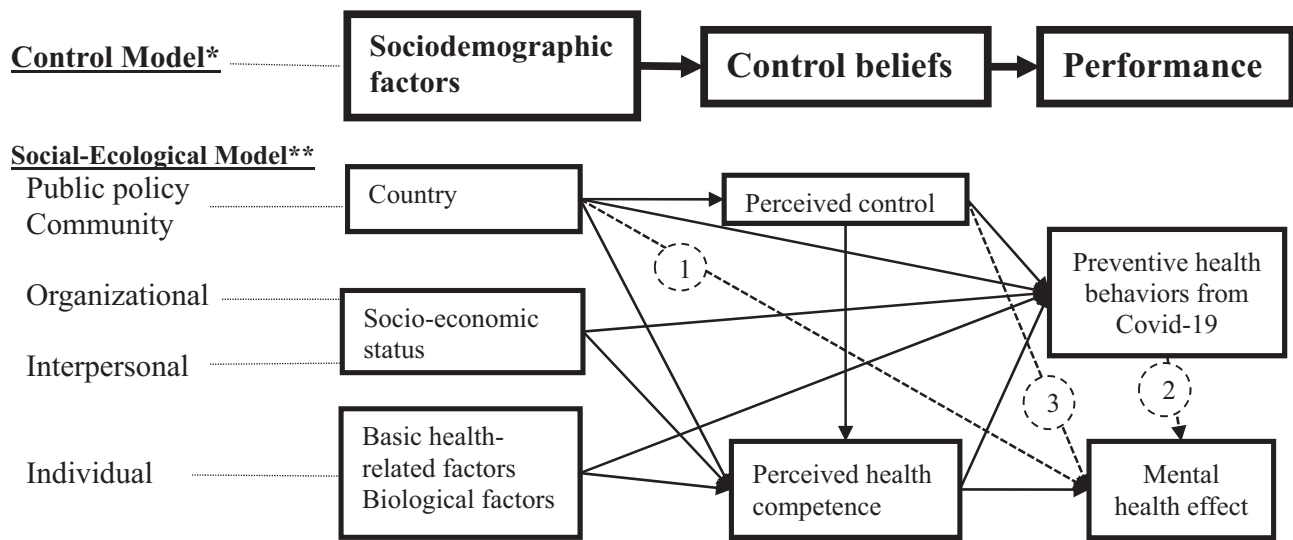


FIG. 1 Conceptual framework. *Note:* 1–3 indicate the hypotheses of association. *Source:* *Adapted from Robinson and Lachman (2017). ** 4. Important Theories and Their Key Constructs (fig. 4) IN e-Source Behavioural & Social Sciences Research.

METHODS

Design, setting, and participants

This study comprised of a cross-sectional comparative design including both undergraduate and graduate nursing students from four universities (three private and one national institution) in the metropolitan areas of Tokyo, Japan, and a three-campus public university in the Pacific Northwest region of the US. These participants were selected for survey because of the researchers' accessibility to the universities. International students were excluded from this analysis to facilitate the comparison of specific cultural differences between Japan and the US.

Data collection

Online questionnaires were administered using Google Forms in Japanese and English for the Japanese and American participants, respectively. The participants were provided with verbal information about the study at the end of classes and/or email invitation to access the Google form that explains the purpose of the anonymous survey, along with the methods, voluntary participation, and observation of privacy. Clicking the 'Agree' button on the online survey indicated that the participant had read and consented to participate in the study. Data were collected from November 2020 to May 2021.

Measurements

This study collected information from the participants, namely, sociodemographic data, the perceived control, self-efficacy scale (Salehi *et al.* 2016) and perceived health competence (Smith *et al.* 1995) scores, and responses to the preventive health behaviours and mental health effect questionnaire (Kondo *et al.* 2021).

Sociodemographic data included biological, basic health-related, and socioeconomic factors, besides the country of origin. Biological factors comprised age and sex/gender; basic health-related factors including alcohol intake (i.e. every day, 4–5 times a week, 2–3 times a week, once a week, rarely, and never), smoking status, hours of sleep per day, and any chronic conditions requiring regular check-ups. These variables reflect general health behaviours and have been investigated in previous studies (Kondo *et al.* 2021; Murray 2013; Salehi *et al.* 2016; Smith *et al.* 1995). Finally, socioeconomic factors included academic status (i.e. undergraduate or graduate, domestic or international), possessing a nursing licence, housing situation (i.e. roommate/housemate or none), religious affiliations, and work status (i.e. full-time, part-time, or unemployed).

The perceived control and self-efficacy scale, adapted from the British General Household Survey's social capital scale, measures perceived influence at both the individual and societal levels (Foxton & Jones 2011). The scale consists of three domains: perceived control over community affairs (four items),

perceived influence over political decisions (four items), and satisfaction with control levels over one's personal life (two items). We used this scale with the assumption that preventive health behaviours especially during the pandemic could be strongly affected by public policy rather than individual factors. The scale measured 10 items with a five-point Likert scale (strongly disagree, disagree, uncertain, agree and strongly agree). A sum of the three domains ranged between 10 and 50, with a higher score indicating a higher level of perceived control and self-efficacy over individual and societal matters (Salehi *et al.* 2016). After obtaining permission from Salehi, initially, the first author translated the scale into Japanese, and then the third author translated it back into English. Thereafter, the first, third, and fourth authors reached a consensus after several discussions and revisions. Cronbach's alpha of the Japanese version scale was 0.71, which was acceptable (Kondo *et al.* 2021). In this study, alpha was 0.71 in Japanese students and 0.68 in American students, which were acceptable.

The perceived health competence scale measures the extent to which an individual feels capable of effectively managing his/her health outcomes (Smith *et al.* 1995), comprising an eight-item instrument measured using a five-point Likert scale (strongly disagree, disagree, uncertain, agree, and strongly agree). This scale contains behavioural expectations and outcomes, with a score ranging from 8 to 40, where higher scores indicate higher health competence. This scale had been translated previously into Japanese, and its reliability and validity were confirmed with 200 residents in Tokyo (94 men and 105 women) aged 20–60 (Togari *et al.* 2004). Furthermore, permission to use the scale for this study was obtained from its developers and translators. In this study, alpha was 0.84 in Japanese students and 0.89 in American students, which were good.

Lastly, the health behaviour questionnaires comprised of two domains: 17 items related to preventative actions mitigating the transmission of COVID-19 (e.g. wearing a mask in public and avoiding crowded, closed, and close-contact settings.), and two items related to mental health effects. Mental health effect questions assessed whether students (1) experienced stress and/or symptoms of depression induced by adhering to the social distancing (stay-home) measures, and (2) experienced feelings of falling seclusion from society. For both domains, participants were required to select one answer on a scale of 3–0 (3 = always, 2 = often, 1 = sometimes, and 0 = never) for each question. The

total score of preventive health behaviour questions ranged from 0 to 51, where higher scores indicate higher levels of practising preventative behaviours. The total mental health effects score ranged from 0 to 6, where higher scores indicated worsening conditions. Initially, the first and second authors created the health behaviour questionnaires based on the Japanese government's recommendations for preventative protocols (Ministry of Health Labour and Welfare 2021) and Kamenidou *et al.*'s (2020) questions. And then, the rest of the authors, who were nursing professionals in Japan and US, confirmed the contents and approved that the questions covered necessary preventive health behaviours and mental health effect during COVID-19 after several discussion and revisions (Kondo *et al.* 2021). The alpha of preventive health behaviours (Japan = 0.80, US = 0.85) were good. Those of the mental health effects were acceptable with 0.72 and good with 0.87 among Japanese and American students, respectively.

Sample size and power

This study used G-Power 3.1.9.7 (Heinrich Heine University of Dusseldorf *n.d.*) to calculate the sample size. To detect the difference between the main outcome of mental health effects with the effect size of 0.3 by Mann–Whitney test, a total of 574 participants (459 from Japan and 115 from the US) were required. An alpha level of 0.05 (two tails), power of 0.8, and an allocation ratio of 4 (due to accessibility of the universities in both countries) were also used. Approximately 1400 and 1200 students from Japan and the US, respectively, were invited to participate.

Analysis

A chi-square test was used to compare nominal variables (e.g. gender, academic status, and religion) of participant characteristics between two countries. Furthermore, Fisher's exact test was used to compare smoking status (i.e. 'yes' or 'no'). While the Mann–Whitney *U*-test was used to compare ordinal variables of work status, frequency of alcohol use, as well as each score (question 1 or 2) and the total score (question one plus 2) of mental health effects. Furthermore, t-tests were performed to compare continuous variables, such as age, sleep duration, as well as the total scores of perceived levels of control, perceived health competence, and preventive health behaviours. The total mental health effect score was divided into two categories,

namely, $3 \geq$ or $3 <$ according to the median, and chi-square tests performed to compare between countries.

Factors associated with the total scores of mental health effects were analysed initially per country before using all data for the bivariate analyses. Spearman's correlation coefficients were used to analyse the association among the total scores of mental health effects, age, work status, frequency of alcohol use, sleep duration, as well as the total score of preventive health behaviours, perceived control, and perceived health competence. Furthermore, either the chi-square test or Fisher's exact test was used to compare mental health effects ($3 \geq$ or $3 <$) between two groups, influenced by gender, academic status, possession of a nursing licence, housing situation, smoking status, and presence of chronic conditions.

Variables related significantly to mental health effects, in either one country or the combined data (i.e. alpha level < 0.05), were selected for hierarchical multiple logistic regressions with a total mental health effect score ($3 \geq$ or $3 <$) presenting an outcome variable. Independent variables were entered across six levels in the following order, country of origin, individual factors, socio-economic factors, preventive health behaviours, perceived control, and perceived health competence.

Furthermore, the score for question 1 which assessed 'having stress and/or symptoms of depression induced by social distancing (stay-home) measures' was significantly higher in Japanese students. Similar hierarchical multiple logistic regression analysis was repeated with the outcome variable of question 1 (1 = always, often, or 0 = sometimes, never), in addition to the analysis of the total mental health score.

Logistic regression assumption includes linearity in the logit for continuous variables, lack of strongly influential outliers, absence of multicollinearity, and independence of errors (Stoltzfus 2011). Linearity in the logit for continuous variables were checked on whether interaction term of each continuous variable and its natural logarithm was significant. Interaction term of age and its logarithm was significantly related to one outcome variable, 'having stress and/or symptoms of depression induced by social distancing (stay-home) measures' ($P = 0.022$); therefore, age was categorized into four levels (~ 19 , 20–29, 30–39, and 40 ~ years). Outliers were checked by z -residual < 2 and leverage < 0.5 . Multicollinearity was checked by Variance Inflation Factor (VIF) < 5 . Independence of errors was checked by Durbin–Watson value between 1.5 and 2.5.

Model fit was assessed using the Hosmer–Lemeshow test ($P > 0.05$) and Nagelkerke R^2 . Changes (Δ)

in Nagelkerke R^2 were calculated to determine how much each variance level was accounted for. The variables of 'graduate student' and 'possession of nursing licence' were very similar. However, 'possession of nursing licence' was selected because VIF was lower than when 'graduate student' was used.

Ethical considerations

All procedures contributing to this study comply with the Helsinki Declaration as revised in 2013 and the ethical standards of the relevant national and institutional committees on human experimentation. The Institutional Review Boards (IRBs) of all five participating universities approved this study. Initially, investigations were conducted at three universities in Japan (IRB No. M2020-166; Kondo *et al.* 2021) before collecting data at two additional universities (IRB No. M2020-171), in Japan and the US (STUDY00012203), respectively.

The students were informed that participation in the study was voluntary, that their answers would not affect or be used for their evaluation, and that they did not have to answer all the demographic questions. However, they were required to answer all the questions for perceived control, perceived health competence, preventative health behaviours, and mental health effects.

All participants could optionally submit their name and email address if they wanted to receive a gift card compensating them for their time and effort. The email addresses of the participants were collected through a Google Form separate from the survey form. Furthermore, gift cards were issued to the participants who expressed their interest.

RESULTS

Participant characteristics

A total of 896 students responded to the survey invitation (response rates: 52.5% in Japan and 12.1% in the US). Data from 878 (739 Japanese and 139 American) participants were used for the analysis after excluding 18 international students (11 in Japan and 7 in the US). Despite missing demographic data, 878 students' data were analysed. This study did not use any substituted values for missing data.

Table 1 shows participant characteristics by country. All data except for smoking status were significantly different between the countries. In contrast to the

American students, the Japanese students were younger ($t = 9.01, P < 0.001$), were mostly female ($\chi^2 = 34.9, P < 0.001$), did not have their nursing licences ($\chi^2 = 197.1, P < 0.001$), not religiously affiliated ($\chi^2 = 73.3, P < 0.001$), worked less ($z = -5.07, P < 0.001$), did not drink alcohol ($\chi^2 = 23.8, P < 0.001$), and did not have chronic conditions ($\chi^2 = 17.7, P < 0.001$). However, perceived health competence ($t = 3.23, P < 0.001$), and perceived control ($t = 8.86, P < 0.001$) were significantly lower among Japanese students than American students. Furthermore, total scores of preventive health behaviours were significantly higher ($t = -8.64, P < 0.001$) among Japanese nursing students than American students.

Comparison of student mental health effects between the two countries

Table 2 shows a larger proportion of Japanese students expressed at least three for total score of mental health effects in contrast to American students (62.4% vs 43.9%, chi-square = 16.6, $P < 0.001$). Specifically, more Japanese students experienced stress and/or symptoms of depression induced by adhering to social distancing (stay-home) measures (question 1) than American students ($z = -4.22, P < 0.001$). However, no difference was observed in having feelings of seclusion from society (question 2; $z = -0.17, P = 0.868$).

Factors related to mental health effects of nursing students during the COVID-19 pandemic

Table 3 shows the association between the total mental health effect scores and characteristics per country. Factors related to mental health effects were similar in both countries. Although perceived control was not significant at an alpha level of 0.05 ($P = 0.098$) in the US due to the limited sample size, $|p|$ was higher than Japanese students (-0.141 vs -0.111). Furthermore, the only notable difference was that nursing students without a nursing licence in Japan had higher mental health effects than students with a nursing licence (66.8 vs 48.0%: total score ≥ 3 ; $P < 0.001$). While in the US, more students with nursing licences expressed higher, yet insignificant mental health effects (45.8 vs 33.3%: total score ≥ 3 ; $P = 0.345$). Furthermore, fewer alcohol use frequency was associated with increased depression/stress in combined data ($\rho = -0.070, P = 0.037$). Based on the bivariate analyses, individual factors of age, gender (biological factors) and frequency of drinking alcohol (basic health-related factor); socio-economic factors of religious affiliations, possession of a nursing licence and work status; and the total scores of preventive health behaviour, perceived control and perceived health competence were selected and were entered into logistic regression.

TABLE 1 Characteristics of participants (N = 878)

	Japan (n = 739)	n	United States (n = 139)	n	P-value	Test
Age, mean (SD)	24.3 (8.4)	717	31.3 (8.5)	138	<0.001	T
Gender, n (%)		732		137	<0.001	C
Male	26 (3.6)	739	20 (14.6)	139		
Female	698 (95.4)		116 (84.7)			
Transgender	0 (0.0)		1 (0.7)			
Not prefer to say	8 (1.1)		0 (0.0)			
Graduate student, n (%)	182 (24.6)	739	115 (82.7)	139	<0.001	C
Possess nursing licence, n (%)	175 (23.7)	739	118 (84.9)	139	<0.001	C
Live with others, n (%)	581 (80.0)	726	129 (94.2)	137	<0.001	C
Religious affiliation(s), n (%)	148 (20.8)	713	72 (57.1)	126	<0.001	C
Work status, n (%)		717		137	<0.001	M
Full time	68 (9.5)		59 (43.1)			
Part time	393 (54.8)		34 (24.8)			
No work	256 (35.7)		44 (32.1)			
Drink alcohol, n (%)	428 (57.9)	739	101 (72.7)	139	<0.001	C
Smoking status, n (%)	15 (2.0)	739	4 (2.9)	139	0.524	F
Sleep hours, mean (SD)	6.7 (1.2)	739	7.2 (1.2)	135	<0.001	T
Have chronic condition(s), n (%)	83 (11.2)	739	34 (24.5)	139	<0.001	C
Perceived health competence, mean (SD)	28.0 (5.8)	739	29.7 (4.9)	139	<0.001	T
Perceived control, mean (SD)	31.3 (5.1)	739	35.4 (4.6)	139	<0.001	T
Preventive health behaviours, mean (SD)	41.5 (5.6)	739	37.0 (6.1)	139	<0.001	T

C, chi-square test; F, Fisher's exact test; M, Mann-Whitney U-test; T, t-test.

TABLE 2 Comparison of mental health effect of nursing students between Japan and United states

	Score	Frequency	Japan (n = 739) n (%)	United States (n = 139) n (%)	P value
Total score	0–6	3 and greater	461 (62.4)	61 (43.9)	<0.001 [†]
1. Have stress and/or symptoms of depression due to following the social distancing (stay home) orders	0	Never	73 (9.9)	17 (12.2)	<0.001 [‡]
	1	Sometimes	187 (25.3)	68 (48.9)	
	2	Often	330 (44.7)	31 (22.3)	
	3	Always	149 (20.2)	23 (16.5)	
2. Have a feeling of falling apart from society	0	Never	177 (24.0)	29 (20.9)	0.868 [‡]
	1	Sometimes	264 (35.7)	62 (44.6)	
	2	Often	223 (30.2)	30 (21.6)	
	3	Always	75 (10.1)	18 (12.9)	

[†]Chi-square test.

[‡]Mann–Whitney *U*-test.

TABLE 3 Factors related to mental health effect in bivariate analysis

Spearman's correlation	Japan (n = 739)		The US (n = 139)		Total (N = 878)	
	ρ	<i>P</i> -value	ρ	<i>P</i> -value	ρ	<i>P</i> -value
Age	−0.141	<0.001	−0.071	0.406	−0.166	<0.001
Work status	−0.105	0.005	0.011	0.900	−0.096	0.005
Drink alcohol, frequency	−0.025	0.498	−0.053	0.533	−0.041	0.219
Sleep hours	0.009	0.800	0.012	0.891	−0.004	0.902
Preventive health behaviours	0.090	0.014	0.049	0.569	0.110	0.001
Perceived control	−0.111	0.003	−0.141	0.098	−0.135	<0.001
Perceived health competence	−0.223	<0.001	−0.277	<0.001	−0.237	<0.001
% of Total score $\geq 3^{\dagger}$	<i>n</i> (%)	<i>P</i> -value	<i>n</i> (%)	<i>P</i> -value	<i>n</i> (%)	<i>P</i> -value
Male	11 (42.3)	0.039	4 (20.0)	0.027	15 (32.6) [‡]	<0.001
Female	440 (63.0)		56 (48.3)		496 (60.9)	
Graduate student	88 (48.4)	<0.001	50 (43.5)	0.826	138 (46.5)	<0.001
Undergraduate	373 (67.0)		11 (45.8)		384 (66.1)	
Possess nurse licence	84 (48.0)	<0.001	54 (45.8)	0.345	138 (47.1)	<0.001
No nurse licence	377 (66.8)		7 (33.3)		384 (65.6)	
Live with somebody	356 (61.3)	0.567	54 (41.9)	0.290	410 (57.7)	0.174
Live alone	93 (64.1)		5 (62.5)		98 (64.1)	
Have religion	86 (58.1)	0.296	31 (43.1)	1.000	117 (53.2)	0.038
No religion	356 (63.0)		23 (42.6)		379 (61.2)	
Smoker	12 (80.0)	0.186	2 (50.0)	1.000	14 (73.7)	0.243
Non-smoker	449 (62.0)		59 (43.7)		508 (59.1)	
Have chronic condition	53 (63.9)	0.811	19 (55.9)	0.116	72 (61.5)	0.686
No chronic condition	408 (62.2)		42 (40.0)		450 (59.1)	

US, United States.

[†]Fisher's exact test or chi-square test.

[‡]32.6% of male and 60.9% of female students had a minimum total score of 3.

Table 4 shows the result of hierarchical logistic regression, which analysed factors related to the total mental health effect score. There was no significant difference in mental health effects between countries after adjusting for individual and socio-economic factors

(Step 3). Specifically, when either possessing nurse licence or work status was added, the country variable became insignificant although none of socio-economic factors was significant (Step 3). Higher preventive behaviour was associated significantly with higher mental

TABLE 4 Logistic regression of factors related to mental health effects of nursing students during COVID-19 pandemic in Japan and the US

Step	1 Country	2 Add individual factors	3 Add socio-economic factors	4 Add preventive health behaviours	5 Add perceived control	6 Add perceived health competence
Japan (vs the US)	2.12 (1.47–3.06)***	1.54 (1.04–2.28)*	1.45 (0.90–2.33)	1.27 (0.78–2.06)	1.00 (0.60–1.67)	0.92 (0.55–1.55)
Age (10-year categories)		0.62 (0.52–0.75)***	0.66 (0.51–0.85)**	0.64 (0.50–0.82)***	0.61 (0.47–0.79)***	0.62 (0.48–0.81)***
Female (vs male)		2.50 (1.27–4.92)**	2.46 (1.18–5.10)*	2.30 (1.10–4.80)*	2.28 (1.08–4.79)*	2.17 (1.02–4.61)*
Frequency of drinking alcohol		1.11 (0.97–1.27)	1.10 (0.95–1.26)	1.11 (0.96–1.28)	1.12 (0.97–1.29)	1.16 (1.01–1.35)*
Have religion			0.96 (0.68–1.36)	0.95 (0.67–1.35)	0.97 (0.68–1.39)	0.95 (0.66–1.36)
Possess nurse licence			0.92 (0.57–1.48)	0.91 (0.57–1.47)	0.93 (0.58–1.50)	0.88 (0.54–1.44)
More work			0.83 (0.66–1.05)	0.84 (0.66–1.06)	0.85 (0.67–1.07)	0.85 (0.66–1.08)
Preventive health behaviours				1.03 (1.01–1.06)*	1.04 (1.01–1.07)**	1.05 (1.02–1.08)***
Perceived control					0.95 (0.92–0.98)***	0.97 (0.94–0.99)*
Perceived health competence						0.93 (0.90–0.96)***
Negelkerke R^2	0.025	0.079	0.087	0.095	0.114	0.155
Δ Negelkerke R^2	0.025	0.054	0.008	0.008	0.019	0.041
Hosmer & Lemeshow test (P -value)	–	0.627	0.671	0.674	0.114	0.968

Logistic regression with outcome: Total score of mental health effect ≥ 3 , < 3 ; odds ratio (95% confidence interval); * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Final model: Variance Inflation Factor of all variables < 2.5 , Durbin-Watson = 1.993, leverage < 0.1 .

health effects, despite R^2 accounting for only 0.8% (Step 4). When perceived control was added, the Odds ratio of preventive behaviour increased by 1% (Step 5). Perceived control was associated negatively with mental health effects, which accounted for 1.9% of the variance. The association remained significant even after adding perceived health competence (Step 6). Adding the interaction term of country and possessing a nurse licence did not yield significant results and VIF increased over 10 although R^2 increased (0.157). Therefore, the interaction term was excluded from the final model. In the final model, factors related to higher mental health effect were younger age [Odds Ratio (95%CI) = 0.62 (0.48–0.81)], female gender [OR = 2.17 (1.02–4.61)], more frequent alcohol drink [OR = 1.16 (1.01–1.35)], higher preventive health behaviour [OR = 1.05 (1.02–1.08)], lower perceived control [OR = 0.97 (0.94–0.99)], and lower perceived health competence [OR = 0.93 (0.90–0.96)]. VIF of all variables were under 2.5. Although there were four cases that had z -residual > 2 , the highest leverage was 0.057; therefore, the four cases were not excluded.

Factors related to stress/depression of nursing students under COVID-19 pandemic

Table 5 shows the results of the hierarchical logistic regression, which analysed factors related to stress/depression (question 2). After adjusting for individual

factors, socio-economic factors, and preventive behaviours, nursing students in Japan demonstrated significantly higher levels of stress/depression (Step 4). When perceived control was added, no differences were observed between countries (Step 5). In the final model, factors associated with higher stress/depression were younger age [OR (95%CI) = 0.74 (0.57–0.95)], female gender [OR = 2.22 (1.05–4.71)], higher preventive health behaviour [OR = 1.03 (1.01–1.06)], and lower perceived health competence [OR = 0.94 (0.91–0.97)] (Step 6). VIF of all variables were under 2.5. Although there were two cases that had z -residual > 2 , the highest leverage was 0.059; therefore, the two cases were not excluded.

DISCUSSION

This study compared the mental health effects of the COVID-19 pandemic on nursing students in Japan and the US. The Japanese students demonstrated higher mental health effects, particularly stress and/or depression induced by adhering to social distancing measures. However, no difference was observed after adjusting for individual factors, socio-economic factors, preventive behaviours, and control beliefs. The Japanese students exhibited higher preventive behaviour and lower control beliefs, which can be related to higher mental health effects. To our knowledge, this is the first study to compare perceived control, preventative health

behaviours, and mental health effect between participants from Japan and the US, particularly in the context of the COVID-19 pandemic.

Hypothesis 1 partially supported that the mental health effect was higher in Japanese students. Particularly, Japanese students demonstrated higher stress and/or symptoms of depression upon adhering to social distancing measures. However, no difference was observed in having a feeling of seclusion from society. Staying home induced feelings of stress and/or depression among the participants. However, several methods were available to enable communication with people including social media and online classes, to mitigate feelings of seclusion from society. Furthermore, younger and female students were associated with higher mental health effects, who comprised a higher proportion in this study. This could attribute to the higher mental health effect among Japanese students.

These findings agreed partially with a previous study that found that younger and female university students had an increased susceptibility to mental health degradation before and during the pandemic (Sequeira *et al.* 2022). Furthermore, Sequeira *et al.* (2022) reported that limited social support can impact socioeconomic and health outcomes among students as out-of-home students had an increased susceptibility to mental health challenges. However, this study showed that socioeconomic status was not related to mental health effects. One reason could be that students who participated in the study had relatively similar socioeconomic conditions and the difference was too insignificant to be detected.

Hypothesis 2 supported that higher preventive health behaviours were associated with higher (worse) mental health effects. Japanese students showed significantly higher preventative health behaviours than American students, which could attribute to the higher mental health effect in Japanese students. Furthermore, Zhao *et al.* (2020) reported that female students exhibited more severe depressive symptoms than male students. While preventive behaviours were higher among female students, committing preventive health behavioural practices can inevitably restrict one's freedom, thus affecting individual mental health and causing conditions such as isolation and depression (Zhao *et al.* 2020). However, when perceived health competence was added, the Odds Ratio of female decreased in both models (Tables 4 and 5), which indicates that mental health effects can be lower if female students showed higher levels of perceived health competence.

Upon adjusting for preventive health behaviour, stress and/or depression in Japanese students was still approximately double the rate in American students, suggesting that when preventive health behaviour is at the same level, Japanese students have more stress and/or depression. After adjusting for perceived control, no significant difference was observed between the countries for stress and/or depression. These findings indicate that if the level of the perceived control is the same, no difference in stress and/or depression levels would be observed between the countries. Similarly, Zheng *et al.* (2020) indicated that perceived control can buffer the mental health consequences of preventive health behaviours.

Hypothesis 3 supported that higher perceived control was associated with lower (improved) mental health effects, despite the weakened association after controlling for perceived health competence. Both perceived control and perceived health competence were significantly lower in Japanese students than in American students, perhaps justifying the higher mental health effects among Japanese students. The total R^2 score for control beliefs was higher than the total score of individual factors (0.054 vs $0.019 + 0.041 = 0.060$ for the total score of mental health effects, 0.035 vs $0.012 + 0.031 = 0.043$ for stress and/or depression). Lower perceived control of Japanese students was consistent with previous study findings (Hornsey *et al.* 2019). Moreover, lower levels of perceived control in Japanese individuals could be related to the unique Japanese culture of valuing networks, such as respecting others' feelings and wishes and conforming instead of individualism (Hornsey *et al.* 2019). Furthermore, Japanese culture accentuates the importance of modest expressions and self-evaluations of low power to survive harmoniously in a collectivist society (Yamagishi *et al.* 2012). Despite the low percentage of chronic conditions among Japanese students, a significantly lower level of perceived health competence was observed. Villarreal and Heckhausen (2017) defined perceived control as subjective as opposed to actual control. Thus, Japanese students perceive low levels of their ability to control, resulting in higher mental health effects, particularly stress/depression.

The Global Gender Gap Index ranked Japan and the US 121st and 53rd, respectively, out of 153 countries (World Economic Forum 2020). Besides Japan's modest culture, social status and political power among females in Japan are lower, which could justify the lower perceived control of female students.

TABLE 5 Logistic regression of factors related to stress/depression among nursing students in Japan and the US during the COVID-19 pandemic

Step	1 Country	2 Add individual factors	3 Add socio-economic factors	4 Add preventive health behaviours	5 Add perceived control	6 Add perceived health competence
Japan (vs US)	2.90 (2.00–4.21)***	2.23 (1.50–3.32)***	2.03 (1.26–3.26)**	1.91 (1.16–3.10)*	1.57 (0.95–2.62)	1.49 (0.89–2.49)
Age (10-year categories)		0.70 (0.58–0.85)***	0.76 (0.59–0.97)*	0.74 (0.58–0.96)*	0.72 (0.94–0.99)*	0.74 (0.57–0.95)*
Female (vs male)		2.47 (1.25–4.89)**	2.43 (1.17–5.06)*	2.35 (1.12–4.92)*	2.34 (1.11–4.93)*	2.22 (1.05–4.71)*
Frequency of drinking alcohol		1.06 (0.93–1.22)	1.05 (0.92–1.21)	1.06 (0.92–1.22)	1.07 (0.92–1.23)	1.10 (0.95–1.27)
Have religion			0.89 (0.62–1.26)	0.88 (0.62–1.25)	0.90 (0.63–1.28)	0.88 (0.62–1.26)
Possess nurse licence			0.84 (0.52–1.35)	0.84 (0.52–1.35)	0.85 (0.53–1.37)	0.81 (0.50–1.31)
More work			0.88 (0.70–1.12)	0.89 (0.70–1.12)	0.90 (0.71–1.14)	0.90 (0.71–1.15)
Preventive health behaviours				1.01 (0.99–1.04)	1.02 (0.99–1.05)	1.03 (1.01–1.06)*
Perceived control					0.96 (0.93–0.99)**	0.97 (0.94–1.00)
Perceived health competence						0.94 (0.91–0.97)***
Negelkerke R^2	0.049	0.084	0.094	0.096	0.108	0.139
Δ Negelkerke R^2	0.049	0.035	0.010	0.002	0.012	0.031
Hosmer & Lemeshow test (P -value)	–	0.237	0.141	0.452	0.656	0.170

Logistic regression with outcome: Experience stress and/or symptoms of depression induced by adhering to social distancing (stay-home) measures (1 = always, often, 0 = sometimes, never); odds ratio (95% confidence interval); * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Final model: Variance Inflation Factor of all variables < 2.5 , Durbin–Watson = 2.027, leverage < 0.1 .

Limitations and future studies

The generalizability of this study could be limited as convenient samples were used, and the response rate among US students was very low. This study reported factors significantly associated with mental health effects. However, the low R^2 indicated that there may be unknown factors related to mental health effects. Furthermore, this was a cross-sectional study, thus the cause-effect relationships among the variables were not justified. Therefore, future studies should investigate how young Japanese adults’ perceived control affects their mental health as they age. Furthermore, future studies should determine if perceived control can be increased through training. Despite the low R^2 score, the total R^2 score of control beliefs was higher than the total score of individual factors. Thus, the effect of control beliefs should not be overlooked, and future studies should determine the necessity of increasing control beliefs. Furthermore, studies should increase the sample sizes and broaden the different levels of perceived control. Future studies should investigate whether the gender gap is related to perceived control and mental health.

CONCLUSION

In contrast to US students, the Japanese students demonstrated higher mental health effects, particularly stress and depression induced by adhering to the social

distancing measures. However, no difference was observed after adjusting for individual factors, preventive behaviours, and perceived control. Furthermore, higher levels of preventive health behaviours were associated with higher mental health effects. While higher levels of perceived control were associated with lower mental health effects. The results of this study can be utilized in improving educational programmes for students to have more control beliefs not only at university but also at high school or even elementary school.

RELEVANCE FOR PRACTICE

Risk factors for poorer mental health during the COVID-19 pandemic included nursing students with lower levels of both perceived control and perceived health competence. Thus, this study recommends promoting ways for nursing students to achieve a sense of control, particularly in their health and personal life, despite not having or expressing actual control. For example, ‘political science’ can be a required subject in the first year of the nursing curriculum (currently elective in Japan), where students learn importance of having interest in policy and sense of control, which is closely related to people’s health. Association between control belief and health can also be introduced in the subject ‘health promotion education’. In this way, more students will be aware about policy and

understand the importance of preventive health behaviours, which government encourage people to do to prevent infection.

Furthermore, as the majority of nursing students are female, adequate support and care (e.g. regular individual communication with faculty members and counselling with health care staff to prevent mental effect and/or find it early) ought to be provided to younger female nursing students, who face an increased risk of negative mental health effects. Creating opportunities for students to share their experiences related to their challenges during the pandemic using online tool may also be helpful to decrease social isolation. In addition, more education to empower female students from younger age and social system to support women should be necessary in Japan.

ETHICAL APPROVAL

All procedures contributing to this study comply with the Helsinki Declaration as revised in 2013 and the ethical standards of the relevant national and institutional committees on human experimentation. The Institutional Review Boards (IRBs) of all five participating universities approved this study. Initially, investigations were conducted at three universities in Japan (IRB No. M2020-166) before collecting data at two additional universities (IRB No. M2020-171) in Japan, and the US (STUDY00012203), respectively.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

REFERENCES

- Albaqawi, H. M., Alquwez, N., Balay-Odao, E. *et al.* (2020). Nursing students' perceptions, knowledge, and preventive behaviors toward COVID-19: A multi-university study. *Frontiers in Public Health*, 8, 573390.
- Dictionary.com. (2022). *Lockdown*. [Cited 10 August 2022]. Available from: URL: <https://www.dictionary.com/browse/lockdown>
- e-Source Behavioral & Social Sciences Research. (n.d.). *Social and Behavioral Theories*. [Cited 3 May 2022]. Available from: URL: <https://obssr.od.nih.gov/wp-content/uploads/2016/05/Social-and-Behavioral-Theories.pdf>
- Foxton, F. & Jones, R. (2011). *Social capital indicators review*. Newport, UK: Office for National Statistics.
- García-González, J., Ruqiong, W., Alarcon-Rodriguez, R., Requena-Mullor, M., Ding, C. & Ventura-Miranda, M. I. (2021). Analysis of anxiety levels of nursing students because of e-learning during the COVID-19 pandemic. *Healthcare*, 9 (3), 252.
- Goodwin, R., Wiwattanapantuwong, J., Tuicomepee, A., Suttiwan, P., Watakakosol, R. & Ben-Ezra, M. (2021). Anxiety, perceived control and pandemic behaviour in Thailand during COVID-19: Results from a National Survey. *Journal of Psychiatric Research*, 135, 212–217.
- Hasuike, M., Hara, Y., Mori, H. M. *et al.* (2021). Influence of new coronavirus pandemic on behavior and awareness of young nurses and nursing students in Japan. *BMC Nursing*, 20, 237.
- Heinrich Heine University of Dusseldorf. (n.d.). *G*Power: Statistical Power Analyses for Windows and Mac* [Online]. [Cited 12 August 2020]. Available from: URL: <http://www.gpower.hhu.de/en.html>
- Hornsey, M. J., Greenaway, K. H., Harris, E. A. & Bain, P. G. (2019). Exploring cultural differences in the extent to which people perceive and desire control. *Personality and Social Psychology Bulletin*, 45, 81–92.
- Husky, M. M., Kovess-Masfety, V. & Swendsen, J. D. (2020). Stress and anxiety among university students in France during Covid-19 mandatory confinement. *Comprehensive Psychiatry*, 102, 152191.
- Kamenidou, I. E., Stavrianea, A. & Liava, C. (2020). Achieving a Covid-19 free country: Citizens preventive measures and communication pathways. *International Journal of Environmental Research and Public Health*, 17 (3), 4633.
- Kondo, A., Abuliezi, R., Naruse, K., Oki, T., Niitsu, K. & Ezeonwu, M. C. (2021). Perceived Control, Preventative Health Behaviors, and the Mental Health of Nursing Students During the COVID-19 Pandemic: A Cross-Sectional Study. *Inquiry*, 58, 469580211060279.
- Ministry of Health Labour and Welfare. (2021). *Novel Coronavirus (COVID-19)* [Online]. [Cited 3 May 2021]. Available from: URL: https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000164708_00079.html
- Mulyadi, M., Tonapa, S. I., Luneto, S., Lin, W. T. & Lee, B. O. (2021). Prevalence of mental health problems and sleep disturbances in nursing students during the COVID-19 pandemic: A systematic review and meta-analysis. *Nurse Education in Practice*, 57, 103228.
- Murray, C. J. L. (2013). The state of US health, 1990-2010: Burden of diseases, injuries, and risk factors. *JAMA*, 310, 591–608.

- Nie, S., Sun, C., Wang, L. & Wang, X. (2021). The professional identity of nursing students and their intention to leave the nursing profession during the coronavirus disease (COVID-19) pandemic. *Journal of Nursing Research*, 29, e139.
- Robinson, S. A. & Lachman, M. E. (2017). 9. Perceived control and behavior change – A personalized approach. In: J. W. Reich & F. J. Infura (Eds). *Perceived Control Theory, Research and Practice in the First 50 Years*. (pp. 201–227). Cary, USA: Oxford University Press.
- Rosenthal, L., Lee, S., Jenkins, P. *et al.* (2021). A survey of mental health in graduate nursing students during the COVID-19 pandemic. *Nurse Educator*, 46 (4), 215–220.
- Salehi, A., Harris, N., Coyne, E. & Sebar, B. (2016). Perceived control and self-efficacy, subjective well-being and lifestyle behaviours in young Iranian women. *Journal of Health Psychology*, 21 (7), 1415–1425.
- Sequeira, C., Araújo, O., Lourenço, T., Freitas, O., Carvalho, J. C. & Costa, P. (2022). The impact of the COVID-19 pandemic on the mental health of Portuguese university students. *International Journal of Mental Health Nursing*, 31, 920–932.
- Smith, M. S., Wallston, K. A. & Smith, C. A. (1995). The development and validation of the Perceived Health Competence Scale. *Health Education Research*, 10 (1), 51–64.
- Stoltzfus, J. C. (2011). Logistic regression: a brief primer. *Academic Emergency Medicine*, 18, 1099–1104.
- Sun, Y., Wang, D., Han, Z., Gao, J., Zhu, S. & Zhang, H. (2020). Disease prevention knowledge, anxiety, and professional identity during COVID-19 pandemic in nursing students in Zhengzhou, China. *Journal of Korean Academy of Nursing*, 50 (4), 533–540.
- Togari, T., Ikezaki, S., Yamazaki, Y., Ito, M., Zenko, A. & Taguchi, R. (2004). The development of Perceived Health Competence Scale (PHCS) Japanese version. *Journal of Health and Human Ecology*, 70 (5), 184–195.
- Villarreal, B. & Heckhausen, J. (2017). Control striving and control perception in a life span developmental framework. In: J. W. Reich & F. J. Infuria (Eds). *Perceived Control Theory, Research and Practice in the First 50 Years*, 11, 253–279. Cary, USA: Oxford University Press.
- World Economic Forum. (2020). *Global Gender Gap Report 2020* [Online]. [Cited 5 May 2022]. Available from: URL: <https://resourcewatch.org/data/explore/Gender-Gap-Index-2?section=Discover&selectedCollection=&zoom=0.23694847099404298&lat=0&lng=165.762750589015&pitch=0&bearing=0&basemap=dark&labels=light&layers=%255B%257B%2522dataset%2522%253A%25220be2ce12-79b3-434b-b557-d6ea92d787fe%2522%252C%2522opacity%2522%253A1%252C%2522layer%2522%253A%25228f198af3-a9cc-4d22-b6ac-25a1d2baa7f3%2522%257D%255D&aoi=&page=1&sort=most-viewed&sortDirection=-1>
- World Health Organization. (2022). *WHO Coronavirus (COVID-19) Dashboard* [Online]. [Cited 19 June 2022]. Available from: URL: <https://covid19.who.int/>
- Yamagishi, T., Hashimoto, H., Cook, K. S. *et al.* (2012). Modesty in self-presentation: A comparison between the USA and Japan. *Asian Journal of Social Psychology*, 15 (1), 60–68.
- Yamamoto, T., Uchiumi, C., Suzuki, N., Yoshimoto, J. & Murillo-Rodriguez, E. (2020). The Psychological Impact of 'Mild Lockdown' in Japan during the COVID-19 Pandemic: A Nationwide Survey under a Declared State of Emergency. *International Journal of Environmental Research and Public Health*, 17 (24), 1–19. <https://doi.org/10.3390/ijerph17249382>
- Yuan, T., Liu, H., Li, X. D. & Liu, H. R. (2020). Factors affecting infection control behaviors to prevent COVID-19: An online survey of nursing students in Anhui, China in March and April 2020. *Medical Science Monitor*, 26, e925877.
- Zhao, B., Kong, F., Aung, M. N., Yuasa, M. & Nam, E. W. (2020). Novel coronavirus (COVID-19) knowledge, precaution practice, and associated depression symptoms among university students in Korea, China, and Japan. *International Journal of Environmental Research in Public Health*, 17, 1–17.
- Zheng, L., Miao, M. & Gan, Y. (2020). Perceived control buffers the effects of the COVID-19 pandemic on general health and life satisfaction: The mediating role of psychological distance. *Applied Psychology: Health and Well Being*, 12 (4), 1095–1114.
- Zhu, Y., Wang, H. & Wang, A. (2021). An evaluation of mental health and emotion regulation experienced by undergraduate nursing students in China during the COVID-19 pandemic: A cross-sectional study. *International Journal of Mental Health Nursing*, 30 (5), 1160–1169.